



Here we will try and explain what each term means, and describe why they are not interchangeable.

The difference between PPI (pixels per inch) and DPI (dots per inch) continues to cause a great deal of confusion. Although PPI and DPI are often used interchangeably, they are not the same thing.

Simply put, PPI refers to the resolution of a digital image as you view it on a screen, and DPI refers to how an image is printed. Unfortunately, many people, and even companies, continue to mistakenly use the terms interchangeably.

PPI (Pixels-Per-Inch)

PPI refers to screen resolution, and is easy to understand. A pixel is a tiny, square-shaped block of colour. A digital image — whether it's a photograph or another type of graphic — is composed of thousands or millions of individual pixels. So, PPI refers to the number of pixels-per-inch in a digital image – on your computer monitor, or any other digital screen. Pixels are square and in contact with the adjacent pixels. The number of pixels-per-inch in your digital image will affect the print size of your photo and will affect the quality of the output. The more pixels-per-inch that a digital image contains, the higher its 'resolution' is said to be. More pixels-per-inch means more detail and crisper images.

How PPI Affects Print Size

Many people think if an image looks good on the screen, it will look when it's good printed out. This is not always the case. If you plan to print your images, you want to keep them at the highest resolution (PPI) that you can.

When printing an image, it's important to know how large you can print the image while still retaining an acceptable level of quality and detail.

The total amount of pixels that an image contains dictates the maximum size in inches it can be printed without a noticeable loss in quality. Print professionals recommend that, in order to achieve a high-quality print, an image should be saved at a minimum of 300 PPI.

So, for example, let's say that you have a 3.2 megapixel image that you've saved at 300 PPI. If it measures 2,048 horizontal pixels x 1,536 vertical pixels (2,048 x 1,536 = 3.2 MP), an easy way to find out the maximum size image you can print (in inches) at 300 PPI is to simply divide each of the pixel dimensions by 300. 2,048 divided by 300 = 6.8, and 1,536 divided by 300 = 5.2. In this case, your 3.2-megapixel image can be printed at a maximum size of 6.8 inches horizontally x 5.2 inches vertically while still retaining photorealistic quality.

Monitor PPI

Monitors do not have dots, but do have pixels; the closely related concept for monitors and images is pixels per inch or PPI.

Your computer monitor in general displays images at 72 pixels per inch. This means that our 3.8 megapixel image is going to measure about 32 inches by 24 inches when viewed on a monitor. That is pretty big!

You can determine the display size of the image by dividing the horizontal and vertical pixels by 72. In this case, 2272 / 72 = 31.6 and 1704 / 72 = 23.7.

Use the 72ppi standard when you want to post an image to the Internet (since most people will view the photo on a monitor).



DPI (Dots-Per-Inch)

DPI refers to how a photo is printed on paper (and also to how a paper photo is scanned). DPI is a measure of spatial printing or video dot density, in particular the number of individual dots that can be placed in a line within the span of 1 inch (2.54 cm).

Traditional printing methods use patterns of dots to render photographic images on a printed page. Every pixel in a digital image is created on a print-out by a group of different coloured dots. These dots are made by the different coloured inks used in the printer, usually 4 colours - Cyan, Magenta, Yellow, and black (CMYK), although some photo printers use more. Printers combine these different coloured dots together to make up all the colours of the image. Look at a photo in a magazine with a magnifying lens, and you'll see the dots.

Up to a point, printers with higher DPI produce clearer and more detailed output. A printer does not necessarily have a single DPI measurement; it is dependent on print mode, which is usually influenced by driver settings. The range of DPI supported by a printer is most dependent on the print head technology it uses. A dot matrix printer, for example, applies ink via tiny rods striking an ink ribbon, and has a relatively low resolution, typically in the range of 60 to 90 DPI. An inkjet printer sprays ink through tiny nozzles, and is typically capable of 300-720 DPI. A laser printer applies toner through a controlled electrostatic charge, and may be in the range of 600 to 2,400 DPI.

The DPI measurement of a printer often needs to be considerably higher than the pixels per inch (PPI) measurement of a video display in order to produce similar-quality output. This is due to the limited range of colors for each dot typically available on a printer.

PPI to DPI

When a digital image is being printed, pixels are converted to dots. Pixels are all next to each other with no spaces between them. Dot, however, have spaces between them. Thus DPI is always lower than PPI. A very rough rule-of-thumb is to divide PPI by 2 to get DPI. So, 300 PPI becomes roughly 150 DPI. 150dpi is the accepted standard for printing photographic quality images.

Megapixels and Print Size

Now we can clarify the relationship between the number of megapixels and print size, and why capturing more megapixels lets you create larger prints.

Let's say that you really want high-quality prints of your digital photographs, but you just want to print them at home. In this case, 200ppi should be enough to get the quality you are looking for.

This table shows the relationship between camera megapixels, horizontal and vertical pixels in the image, and the size of a print at 200 pixels per inch.

MEGAPIXELS	IMAGE SIZE (PIXELS)	PRINTED SIZE (INCHES) *
2.0	1224 x 1632	6.1 x 8.2
3.0	1536 x 2048	7.7 x 10.2
4.0	1704 x 2272	8.5 x 11.4
5.0	1944 x 2592	9.7 x 13.0
6.0	2048 x 3072	10.2 x 15.4
8.0	2236 x 3504	11.2 x 17.5

* The printed size is determined by dividing the horizontal and vertical pixels by the pixels per inch.

When your camera has more megapixels, you get large size prints even if you print with lots of pixels per inch. You can always print using less pixels per inch to increase the size of your photographs, but image quality will suffer